THE NEW RADIO FREEDOM.*

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A wall which has stood for years across the line of march of radio has been broken down. We look toward a new horizon and envision a new freedom of action. For the wall which has fallen is the belief in the minds of men that nothing could be done about the problem of the "static" and the cause of the removal of this wall is the discovery of a new principle in electric signaling.[1]

We now see clearly that the way to free ourselves from the effects of the various natural and man-made electrical disturbances which bedevil the present system of radio is to transmit waves whose characteristics differ in kind from those of the disturbances so that it becomes possible to distinguish at the receiver between the signaling and the unwanted kinds of waves. We see not only a freedom from the distressing noises which are only too familiar to us all, but freedom from what the engineer refers to as distortion and cross-modulation resulting in unnatural reproduction of the tones of music and the human voice. Here also the new principle applies, removing the main sources of this trouble and giving us a realism which can, on certain types of broadcast programs, be very startling, indeed.

The application of the principle to the interconnection of broadcasting stations by radio relay will free us from the limitations of the existing wire line system which is now in use and will extend service into regions where economics and physical obstacles do not now permit it to go. The advent of an "all radio" broadcasting system is not too far away. Various

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[1] A method of reducing disturbances in radio signaling by a system of Frequency Modulation. *Proceedings Institute of Radio Engineers*, May 1936.

applications in the field of communications for aircraft, civil emergency and the military services are now being made.

The social and political aspects are taking form, for by a combination of a curious property of the new system [2] and the propagation characteristics of a hitherto unused part of the radio spectrum within which the system is now operating it becomes possible to set up many times the present number of broadcast stations. A "place on the air" hitherto denied them now becomes available for our educational and denominational institutions. Space is also available for stations for every town and city in the country and the increase in the number of channels of communication to the listening public and the attendant problems raised thereby forecasts re-examination of past legislative acts to determine their applicability to and bearing on our freedom of expression.

As we look into the future all this can be clearly seen; beyond lie the parts less clearly visible, perhaps so obscured as to be in the realm of prophecy. Precisely here is the time to look backward; to study the teachings of the history of the art, to observe the effects of the introduction of each new principle, and above all, to compare the prophecies, (or the failure to prophesy) with what actually came to pass.

The outstanding examples are not hard to find. Turning to the early days of Marconi, we see him transmitting a distance of a few miles with the waves of Hertz, limited, as those who understood electromagnetic theory were not slow to point out, by the same laws as those which governed the transmission of light. Who could foresee that in future experiments he was to elevate one of the elements of the Hertz oscillator and ground the other, thereby attaching the waves to the surface of the earth so that the barrier of the horizon was to disappear? And who, even after the principle of Marconi's discovery became known foresaw how far the art would develop before it came upon another of the great barriers which was to check its progress for a time?

This barrier lay in the fact that the energy which created the signal in the receiving system was limited to that actually transmitted through space from the sending station. Often-

[2] The ability to reject the weaker of two signals on the same channel.

times these signals were so faint in the then universally used telephone head set as to become discernible only through the holding of ones breath, an experience which was an every day occurrence to the experimenter of those times. The finding of a method of causing the received signal to release and to control locally created energy in any required amount some fifteen years after Marconi's great discovery broke down the second barrier. This ushered in the vacuum tube or modern radio era, which was to bring transoceanic communication, a practical radio telephone, and finally broadcasting in its wake. Only the merest part of the vast development to come was forecast, and there was little appreciation that this discovery was to open up an era of inventive progress the like of which the radio art had never seen.

Who was to foresee that some dozen years later, when the art had settled down to the transmission of its overseas communication with waves many miles in length, confident that by the use of these long waves it had overcome one of its major obstacles (the inability of shorter waves to span the oceans in daylight), that a miraculous discovery was to overturn every principle of propagation the art believed in. For, by the utilization of waves shorter than any which had heretofore been employed, infinitely better daylight transmission was to be obtained over greater distances than the long waves ever gave, in fact, to the ends of the earth.

Looking backward over these and other examples of the failure of the prophets to foresee what was to come leaves one with a source of wonderment at their lack of vision until one reflects that, after all, theirs was but the judgment of mortal men. So in endeavoring to appraise the present situation and in seeking to outline the extent of our travels in these newly opened fields before the next great barrier is encountered, ought we not to make our approach with profound distrust of the value of that wisdom and vision which it pleases us to think we possess?

It seems to me that he who fails to learn the lessons of the past, who fails to see that "we look backward as in the glare of a searchlight and forward through an impenetrable fog" and prefers instead to trust his present fleeting vision of what

he thinks he sees is bound to misjudge the future. Would it not be better, and I call this particularly to the attention of those who are to see for the first time the results that follow inevitably from the application of new principles to an art, to be guided by the words of Owen Young spoken many years ago, "What gives me confidence in the future of radio are the things we do not know about it."